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THE COMMON BARK BEETLES AND OTHER INSECTS FOUND IN DOUGLAS FIR

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It is well known that a large number of bark beetles and other insects are associated with the Douglas fir beetle (Dendroctonus pseudotsugae Hopk.) in its attacks on Douglas fir throughout the range of this tree species. In fact, a total of over 100 species of Douglas fir beetle associates have been recorded, some of which feed directly on the tree; some feed on other insects, while the remainder feed entirely on refuse. It is the object of this paper to compile an annotated list of the more common of these insects, which it is hoped will be of assistance to those interested in Douglas fir beetle problems. Unfortunately, all of the insects included in this list do not possess an official English name, so that in many cases the Latin or Greek name will have to suffice.

Bark Beetles

1 -- Dendroctonus pseudotsugae (Hopk.), the Douglas fir beetle. Probably all users of this list are familiar with this bark beetle. It is found in the trunk of the tree from the base to a top diameter of 6-8 inches. Very rarely is it found in the branches or a smaller top. It is a small, cylindrical, dark reddish-brown to black beetle from 3.5 to 7 mm in length. It excavates a straight or somewhat winding egg gallery averaging 10 inches in length but varying from 5 or 6 inches to

2 feet or more. This gallery is always parallel to the grain of the wood. The Douglas fir beetle is a killer of green timber and thus prepares the way for its many associated insects.

2 -- Dendroctonus valens (Lec.), the red turpentine beetle. This insect is found only in the base of the tree and in the roots for a short distance below the ground level. Superficially it resembles the Douglas fir beetle in form and shape, but is considerably larger in size, being from 7 to 9 mm. in length and is light reddish-brown in color. The egg gallery of this insect is similar to that of the Douglas fir beetle except that it is considerably wider, with the eggs laid in such a manner that the larvae feed in groups in irregular excavations. This insect attacks the tree following the attacks by the Douglas fir beetle.

3 -- Trypodendron ponderosae (Sw.), one of the ambrosia beetles or shot-hole borers. This insect is found in the lower trunk and its attacks may be recognized by the small, blue or black-bordered holes penetrating directly into the wood. This is a small beetle, about 3 mm. in length, shining black in color with indistinct red markings. As stated above, this insect works entirely in the sapwood of the tree, excavating its galleries which are stained their characteristic color by a fungus upon which the beetles and their young feed.

4 -- Trypodendron bivittatum (Kby.), one of the ambrosia beetles or shot-hole borers. This insect is similar to Trypodendron ponderosae

in all respects except that the color is shining black marked with yellow.

5 -- Phthorophloeus puberulus. This is one of the small secondary bark beetles found in the top and branches of the tree. It is cylindrical in form, 2 to 3 mm. in length, and varying in color from dark brown to black. It excavates a double gallery which forks at a wide angle across the grain of the wood. Including both branches, the gallery is from 2 to 3 inches long.

6 -- Pseudohylesinus nebulosus (Lec.), another of the small secondary bark beetles found in the top of the tree. It is cylindrical in form, 2 to 3 mm. in length, and mottled dark and light reddish-brown in color. Like the preceding species its gallery forks across the grain of the wood.

7 -- Scolytus unispinosus (Lec.), another of the secondary bark beetles found in the top and branches of the tree. It is a stout insect, 2 to 3 mm. in length, and very deep shining black in color. The rear end of this insect has a peculiar modification in that it appears to have been hollowed out underneath. This beetle also excavates a forked gallery, but unlike the others its gallery forks parallel to the grain of the wood.

8 -- Scolytus monticolae (Sw.). This bark beetle is the same as Scolytus unispinosus in size, form, and color, but the gallery forks across the grain of the wood.

9 -- Scolytus tsugae (Sw.). This secondary bark beetle is similar to the preceding species in appearance and type of gallery construction except that it is larger, being 3 3/4 mm. long.

10 -- Polygraphus rufipennis (Kby.). This secondary bark beetle is found intermingled with the Douglas fir beetle at the upper extreme of fir beetle attacks. It is cylindrical in form, 2-3 mm. in length, and black in color. The gallery pattern of this insect appears as a number of short egg galleries radiating out from a central chamber. This is known as the radiate type of gallery, and the number of egg galleries from one chamber may be 3 or more.

11 -- Dryocetes pseudotsugae (Sw.). This secondary bark beetle is also found in the upper limits of Douglas fir beetle attack. It is a large insect 3 1/2 to 5 mm. in length, and reddish-brown to black in color. It also excavates the radiate type of gallery which is considerably larger than those of the other insects which make this gallery pattern in Douglas fir.

12 -- Dryocetes affaber (Mann.). This insect is very similar to Dryocetes pseudotsugae in everything but size, being only 2 1/2 to 3 mm. in length.

13 -- Pityokteines elegans (Sw.) Size 2 to 5 mm. This secondary bark beetle is a small, black beetle found in the top and branches of the tree. It has a peculiar modification of the rear end, giving it the appearance of having been gouged out from above, and with the edges of this depression variously lined with spines. This modification dis-

tinguishes it from all other insects in Douglas fir. It excavates the radiate type of gallery.

Important Parasites and Predators of the Douglas Fir Beetle

This group comprises those insects which feed on other insects. In the matter of importance, however, only the most common ones which feed on the Douglas fir beetle have been included in this list.

14 -- Thanasimus dubius (Fab.), the minor red-bellied Clerid. The adults of this insect are found on the bark surface of trees which are being attacked by the Douglas fir beetle and the larvae are found at all times beneath the bark of trees containing Douglas fir beetle broods. The adult beetle averages 10 mm. in length and is marked in a definite pattern with red, black, and white, with the under part of the abdomen colored bright red. The adults devour the Douglas fir beetle adults as they attack the tree, and the larvae feed on all brood stages beneath the bark.

15 -- Enoclerus sphegeus (Fab.), the major red-bellied Clerid. This insect is similar to T. dubius in habits and appearance, except that it is larger, averaging 12 mm. in length and is decidedly hairy in appearance, while dubius appears smooth.

16 -- Enoclerus lecontei (Wolc.), the black-bellied Clerid. This insect is fairly rare in Douglas fir. It closely resembles T. dubius in appearance and habits, except that it is slightly smaller in size, averaging 9 mm., the color is black marked with white, and the under

side of the abdomen is shiny black.

17 -- Medetera aldrichi (Wheeler). This insect roughly resembles the common house fly, except that it is smaller, more slender, and has the characteristic appearance of running upright when moving over the bark surface. The adults are found on the bark surface as the trees are being attacked, and the larvae are found at all times beneath the bark. The larva is a long-slender, white worm averaging 9 mm. in length. It is separated from the next species (Lonchaea corticis) by the fact that it is rounded at one end, is thickest at the middle, and tapers to a sharp point at the head end.

18 -- Lonchaea corticis (Taylor). This insect is a small, metallic green fly averaging 5 mm. in length. It has straw-colored markings which can sometimes be seen with the unaided eye. It is similar in habits to Medetera aldrichi. The larva of Lonchaea is recognized by the fact that it is thickest at one end and tapers to a sharp point at the other. At one stage this insect is recognized by the small, red cocoon in which it transforms to the adult fly.

19 -- Coeloides brunneri (Vier.). This insect is by far the most important parasite of the Douglas fir beetle. It is a small, wasp-like insect ranging in size from 2 to 8 mm. The female possesses a long appendage on the end of her abdomen. This appendage is the egg-laying apparatus and is often as long as her body. The head and abdomen of this insect are pale red and the thorax is black. The adults are found on the bark surface after the attacks of the Douglas

fir beetle are a few weeks old. As the larva is transforming into the adult, it is concealed in a small white, gray, or brownish silken cocoon. Each cocoon represents one Douglas fir beetle larva which has been devoured by a Coeloides larva.

20 -- Quedius sp. and Nudobius sp. These two insects belong to a group of beetles known as the Rove Beetles. They are peculiar-appearing beetles which are very rapid in their movements. Both the adults and larvae are found beneath the bark of infested trees. The adults may be recognized by their long (10-12 mm.) worm-like appearance, black shining color with red markings, and their peculiar habit of raising their rear ends in the air when disturbed. Both the adults and larvae feed on all stages of practically all insects found in Douglas fir.

Common Insects Which Feed on Refuse in Douglas Fir

21 -- Agathidium revolvens (Lec.). This little beetle is one of the more common refuse feeders, or saprophytes, found associated with the Douglas fir beetle in its attacks. It is small, 2-3 mm. in length, oval in shape, flattened in form, black and shining. It is found at all points in older Douglas fir beetle attacks.

22 -- Epuraea truncatella (Mann.). This little saprophytic beetle is similar to Agathidium in size, shape, form and habits. In color, however, it is pale yellow to light brown.

23 -- Hypophloeus parallelus (Melsh.). Another saprophytic beetle similar to the preceding two in habits. It is somewhat larger in size,

however, being 2-5 mm. in length, and shining tan in color. In form it is almost cylindrical, and elongate oval in shape.

24 -- Rhizophagus procerus (Coy.). This small saprophytic beetle is found very commonly in infested Douglas fir trees, even in portions containing no other insects. The adult is 2-3 mm. in length, black in color, with two dull red spots in the middle of the back, long and slender in form.

25 -- Cerambycidae, long-horned beetles. Round-headed borers. This group of insects contains a large number of different species. The adults are found only on the bark surface of newly infested trees, and may be recognized by their variegated coloring and long horns or antennae. The larvae, commonly called wood worms, are large, white larvae which bore between the bark and wood and also in the wood of infested trees. The size is usually large.

26 -- Buprestidae, flat-headed borers. This is another large group of wood borers similar in habits to the Cerambycidae. The adults lack the long horns, are decidedly torpedo-shaped, and usually have a metallic lustre on some portion of the body. The larvae are large, white worms, considerably more slender than the Cerambycid larvae.